Distr.
LIMITED

UNIDO/IS.424
6 December 1983

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

ENGLISH

TECHNOLOGICAL SERVICES DELIVERY SYSTEM*

(T S D S)

Prepared by

Development and Transfer
of Technology Branch

* This document has been reproduced without formal editing.

V.83-64928

TABLE OF CONTENTS

		Page
I.	Introduction	1
II.	Objectives of the TSDS	2
III.	Modalities of implementation of the TSDS	2
	Implementation of Phase One	3
	Implementation of Phase Two	8
IV.	Regional-level TSDS	9
V.	Conclusions	13
Annex I	TSDS: The Ilagan/Philippine Experience	15
Annex II	CTCS/Caribbean Experience	18

List of Abbreviations

BSMI	Bureau for Small and Medium Industries
CDB	Caribbean Development Bank
CSMI	Commission for Small and Medium Industries
CTCS	Caribbean Technological Consultancy Services
FORPRIDECOM	Forest Products Research + Industries Development Commission
IRSIs	Industrial Research and Services Institutes
MIRDC	Metal Industries Research and Development Centre
SBACs	Small Business Advisory Centres
SMI	Small and Medium Industries
TEU	Technology and Energy Unit
TRI	Technology Resource Institutions
TSDS	Technological Services Delivery System

TECHNOLOGICAL SERVICES DELIVERY SYSTEM (T S D S)

I. INTRODUCTION

1. It is a recognized fact that small and medium industries (SMIs) have an important role to play in the industrialization process of the developing countries. A common problem, however, which the SMIs often face, whether in a developing or a developed country, is the lack of a systematic supply of technical and tebhnological services and information that respond to the needs of the SMIs and contribute to improve the productivity performances of this group of manufacturers. Developing countries usually do have a number of institutions and organizations that are established to carry out R+D, training, information or other services required by the industry. Whether these institutions are able to discharge their given or anticipated role of "servicing the industries and their needs", particularly for the SMIs in the rural areas of the country, is another problem. The Report of the Joint UNDP/UNIDO Evaluation of Industrial Research and Services Institutes (IRSIs) states that:

> "..... small-scale industries are not being adequately served, due in part to the general inability of small industry to pay capacities of a single IRSI. Such services are usually technically possible but there is little economic or institutional payoff to the IRSI, and furthermore, small-scale industry problems are frequently not challenging to highly trained researchers. Technical extension services can solve the latter aspects but governments may need to develop a mechanism to provide low-cost loans or grants to small-scale industry which will encourage these to request such services, and also to provide alternative supply sources, e.g., productivity centres, industrial estates, consulting firms, etc...."*/

2. This concern was the basis for formulating a concept that would provide a linkage mechanism between the technology resource institutions (TRIs) and the SMIs, especially those in the rural areas, with the aim to systematically provide advisory services, information and training through the sensitization and mobilization of available knowledge, capacities and capabilities at the TRIs. The problem is looked at, not as a lack or absence of the local technological capability to respond to and cope with the needs and requirements of the SMIs,

---

*/ See UNIDO publication ID/B/C.3/86

but more in terms of lack of a mechanism that could function as a pipeline-network between the SMIs and the TRIs, for an increased flow of information on the needs of the SMIs and a channel to provide solutions by the TRIs. In fact, it is often the case that the TRIs of developing countries' are well furnished withmost modern equipment and instruments compatible to the world standard, or even better, and staffed with top notch researchers, scientists and engineers with education and degrees from first class universities and academies in the developed world. How could this capacity and capability be properly mobilized to serve the needs of the industry was therefore the key question to the UNIDO TSDS pilot operation in the Philippines, and later on "transplanted" as a regional programme and carried out as the Caribbean Technological Consultancy Services (CTCS) with the Caribbean Development Bank (CDB).

II. OBJECTIVES OF THE TSDS

3. The objectives of the programme are to:

   a. improve the technological performances of the SMIs;
   b. for this purpose, to undertake a survey of the needs of the SMIs, particularly in the rural area;
   c. strengthen the technical extension services of the TRIs;
   d. for this purpose, to undertake a survey of existing capacities and capabilities available at the TRIs;
   e. create a permanent mechanism for identification of technical assistance requirements of the SMIs, and for technological services delivery by local TRIs responding directly to the needs of the manufacturing sectors; and
   f. identify the nature and type of services required by the SMIs that are not available locally, and make recommendations as to how the situation may be remedied.

III. MODALITIES OF IMPLEMENTATION OF THE TSDS

4. In planning the pilot project in the Philippines, special attention was given to seek the possibility of close integration of the TSDS activities

to the national plans and programmes enacted for SMI development. In this respect, the Government had already taken a number of steps. These included, for instance:

- Establishment of a Commission for Small and Medium Industries (CSMI);
- Creation of a Bureau for Small and Medium Industries (BSMI);
- Creation under the BSMI of a Network of 12 Small Business Advisory Centres (SBACs) to serve the whole country geographically divided into 12 regions;
- Setting up of a Small and Medium Industries Development Fund which would provide financial support to the SMIs for strengthening and upgrading their technological capacities and performances, etc.

5. There was, however, the problem that the measures taken were not bringing the anticipated impact to the SMIs. For instance, the SBACs created by the Ministry of Industry were each staffed by some 5 to 10 small business consultants who advise clients on marketing, finance, accounting systems, production management, general quality control policies, etc. The SBAC's, however, possessed limited technical expertise. The TRI's on the other hand, had the technical expertise but were not represented in the region by field offices. With TSDS, it was deemed possible to facilitate the flow of technical assistance with the TRIs as the source and the SBACs as a channel for its delivery. It was therefore clear that any attempt of developing a technology service delivery mechanism would have to be so built as to complementary support and strengthen these organizational measures as its integrated part. The general framework of the project was based upon the conceptual diagram as shown in Figure 1.

Implementation of Phase - One

6. The implementation of the first phase of the pilot project was carried out as follows:

a. Three (3) industrial sectors of high priority were selected, i.e. metalworking, woodworking and food processing.

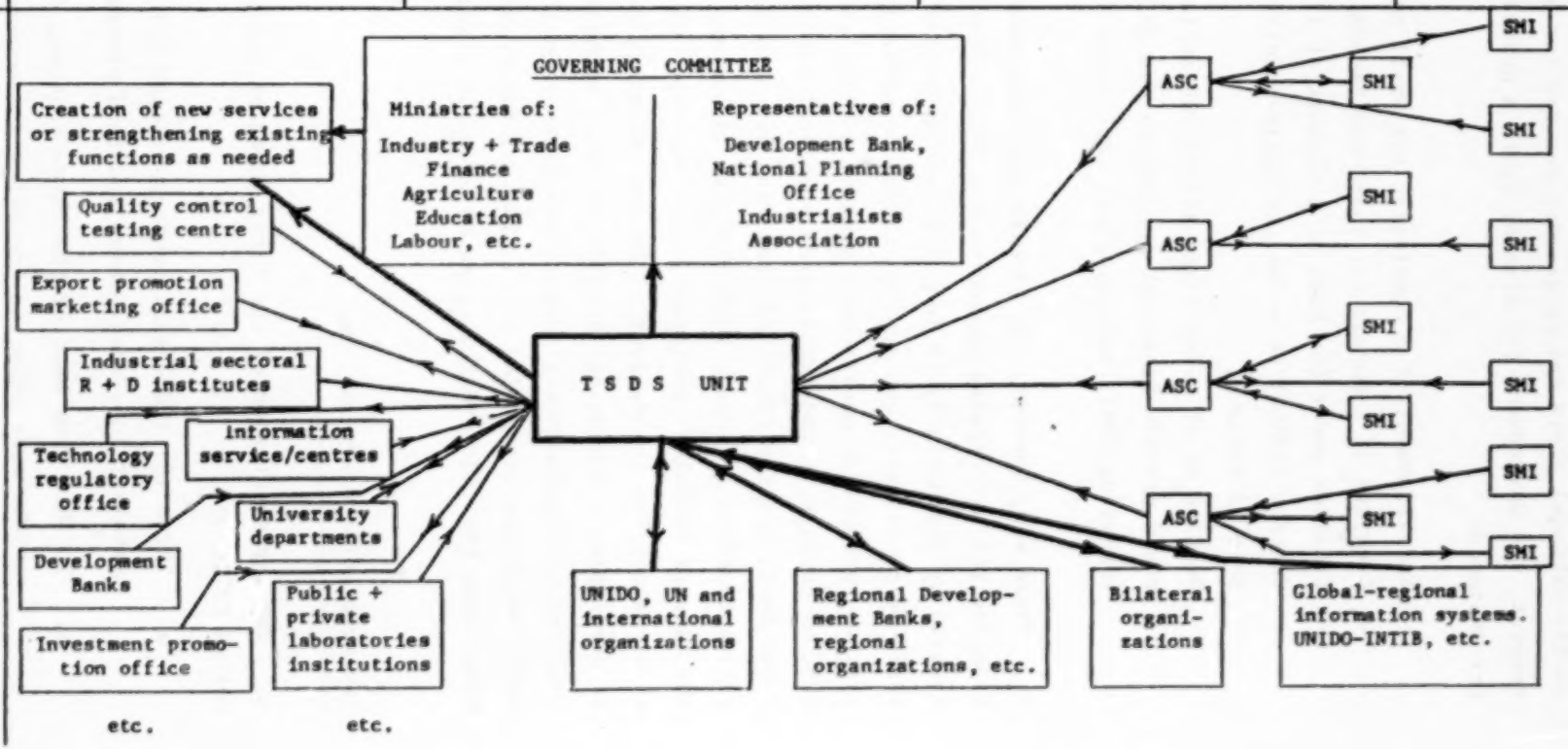
b. 15 SMIs from each of the three sectors, i.e. a total of 45 enterprises were selected for which a needs-survey was carried out by a team of experts.

Figure 1: TECHNOLOGY SERVICES DELIVERY SYSTEM (T S D S)

CONCEPTIONAL DIAGRAM

Components of Network	TECHNOLOGY RESOURCE INSTITUTES (TRIs)	← service agreement →	T S D S CENTRAL CO-ORDINATING UNIT	← branch office-type arrangement →	ADVISORY SERVICE CENTRES (ASC)	← daily contacts →	SMALL + MEDIUM INDUSTRIES (SMI)
Function	Locally available institutions for providing technological and other relevant services.		A central co-ordinating unit acting as focal point of the network under the overall supervision of a governing committee composed of representatives from various Government and non-governmental ministries/agencies and organizations.		Regional offices to provide advice, consultancy and technical assistance on problems concerning technical, technological, financial, managerial, information, training, organizational, etc., matters.		Private and public enterprises of mainly small- and medium scale.

Linkages



c. Five (5) TRIs representing the three sectors were selected for which a capability/capacity survey was carried out by a team of experts.

d. A team of international experts together with their national counterparts from the selected TRIs in Manila and in the respective regions, and senior officials from the BSMI which was designated as the project co-ordinating unit, conducted the surveys through direct visits to the selected SMIs and TRIs.

e. Throughout this exercise, the problem of SMIs were identified and the corresponding role(s) of the TRIs were outlined, so that a system could be developed in such a manner that the technological services of the TRIs could best be utilized at the level of the distant production sites, i.e. the demand-supply linkage.

f. Technology Resource Institutions (TRI) were selected based on their pronounced areas of expertise and their expressed willingness to co-operate within the project framework. They are:

- Forest Products Research + Industries Development Commission (FORPRIDECOM) Specific area of specialization: wood-based industries, e.g., furniture manufacturing. Location: Los Baños, Laguna.
- Metal Industries Research + Development Centre (MIRDC) Specific area of specialization is the metalworking industry sector. Location: Taguig, Metro Manila.
- Department of Food Science and Nutrition, College of Home Economics, University of the Philippines, Diliman Area of specialization: food processing industry. Location: Quezon City.
- Department of Food Science and Technology, College of Agriculture, University of the Philippines, Los Baños Area of specialization: food processing. Location: Los Baños, Laguna.
- Food + Technology Research Department, National Institute of Science and Technology Area of specialization: food processing. Location: Ermita, Manila.

g. BSMI's Small Business Advisory Centres (SBAC) played the role of extension service linking pin between the regional SMI clientele and the participating TRIs. Their functions covered clientele targeting, problem and needs identification, organization of recipient groups for TSDS assistance and follow-through/monitoring activities. Staffing primarily specialized general business consultants.

7. It was immediately recognized that the performances of the SMIs were hampered by a whole range of problems while their solutions were beyond the industries' capabilities. These included, among others, information on new technologies, machineries and equipment; lack of financial resources to carry out modernization and upgrading of their technological capacities; difficulties in management, training, marketing of products as well as securing of proper raw material, design, quality control; and lack of opportunities to receive adequate technical advisory services and technical assistance. In short, the problems were manifold, with an almost complete lack of a possibility to find proper solutions. The problems were simply shoved up on the shelf unless the enterpreneur happened to have some personal contacts with senior persons of an institute or organization in the capital city, from which he could receive the needed advice or assistance.

On the other hand, the surveys also confirmed that there were several TRIs and other organizations or agencies in the capital city, and most likely in the region, whose activities had relevance to and also had the capability to help solve most of the problems.

8. As a result of the Phase-One activities, three distinct types of services emerged to be put into operation as sub-systems during Phase-Two onwards, within the overall framework of TSDS. These were:

a. Plant level Consultancy
b. In-plant Technical Training
c. Technical Information Dissemination

9. a. Plant level Consultancy

The activities would be concerned with technical problems at plant level. Companies which have been identified or which have requested assistance would be visited by the SBAC field officers in order to inquire about

their problems and refer them to the specialized TRI. This might subsequently lead to arranging visits to such plants by the TRIs' national experts, or eventually international experts, for further investigation of such problems or possible provision of on-the-spot solutions. Arrangements of these functions, among others, in this area would be undertaken initially by the SBAC field staff.

b. In-plant Technical Training

Activities of this sub-system would be mainly concerned with training required in several areas, in order to strengthen the human resource infrastructure within the system. The training programmes identified were for:

- SBAC staff. To improve their capabilities in identifying, solving or referring problems to TRIs.
- Management. To improve the capabilities of foremen and factory workers as recipients of the technological flow.
- Further training of the TRIs' technical staff and other organizations concerned on highly specialized aspects of the industry and on ad-hoc subjects of critical importance and concern of the industry.

c. Technical Information Dissemination

The function is geared to support the afore-mentioned sub-systems with a network for gathering and storing information relevant to the common problems of the industry sectors, including those emerging from the past activities, for further dissemination to the SBAC staff and the sector's industrialists. This would also include detailed information on the specialized TRIs' functions and types of services which could be available to the industry.

On the other hand, the flow of information about industry problems to the TRIs, would be instrumental in the re-arrangement of the work programmes of the TRIs, in order to respond to the industry needs. It was decided that the technical information for dissemination through the system would be prepared in the form of a concise technical bulletin and presented in a simplified manner to be easily absorbed at the SMI industrialist's level. The SBAC officers in the regions would be the transfer media of such prepared information and consequently, they would be able to build up a micro-unit of information in the regions. By buildingup such units, the SBAC centres would be able to provide the industry with its basic needs in technical information and eventually function more actively in this respect.

Implementation of Phase - Two

10. Actual implementation of the planned project activities provided the project team with a better insight of operating requirements covering fiscal and non-fiscal considerations. These were immediately noted and incorporated into the operating procedures. The following were specially significant:

a. SMI entrepreneurs need to be appraised on better operational alternatives vis-a-vis their own existing operations. Considering time and manpower limitations, technical training activities were given priority ahead of in-plant consultancy or technical information dissemination to start the TSDS.

b. The assistances coursed through the system, should at all times, have monetary and/or non-monetary inputs from the recipient organizations to emphasize the value of equity investments by them in any undertaking.

c. In view of the significant degree of commonality of problems faced by individual firms within a given industry sector, and the cost advantages provided to entrepreneurs, an industry grouping/ association-based assistance provision approach was adopted. Further, service coverage advantages for the participating agencies was achieved in terms of time, number of firms covered and operating cost savings were achieved.

11. Recognizing the apparent usefulness of the TSDS project and to ensure its continuation on the one hand, and in view of the limited flexibility in budgeting and programme activities of the individual TRIs, the CSMI found it necessary to allocate special project funds to finance the TSDS activities. This can be considered as a positive indication. An example of a successful case is illustrated in Annex I of this Report.

12. Another point worthwhile mentioning is the fact that the BSMI/TSDS project has been expanded to include the operation plans of the NACIDA (National Cottage Industries Development Authority), i.e. its industrial extension forces and the Technology Development Centre within the TRI network.

IV. REGIONAL-LEVEL TSDS

13. During the course of developing and applying the national-level TSDS concept in the Philippines, considerations were given as to whether the idea could not be applied on a regional or sub-regional basis, in line with the TCDC/ECDC principle of international co-operation and the Buenos Aires Plan of Action, adopted at the UN Conference on Technical Co-operation among Developing Countries, 30 August to 12 September 1978. In fact, for certain smaller sized countries, it was difficult or almost impossible to expect that their governments would be able to organize, at the national levels, technical services to satisfy the needs of the industries, particularly the SMIs in a viable form.

14. Accordingly, discussions were carried out with the Caribbean Development Bank (CDB) to try out a pilot operation of the TSDS concept for the island countries in the Caribbean sub-region. Since the TSDS was developed as a tailored system to suit the prevailing circumstances and requirements of the Philippines, certain modifications were made to form what is today known as the Caribbean Technology Consultancy Services Network (CTCS).

15. Many existing industrial enterprises in the Caribbean, often in the More Developed Countries (MDCs) but perhaps even more frequently in the Less Developed Countries (LDCs), are unable to achieve their full potential or to operate at satisfactory levels of effectiveness. A major contributing factor is a lack of technological expertise regarding important aspects of production such as product design, production processes, quality control, equipment selection and maintenance, capacity utilization and energy conservation. Related functions such as financial and cost analysis, market research and manpower training are also frequently underdeveloped. Institutions in most of the countries are able to provide some of the necessary services but cannot cover the full range needed and, in some cases, are unable to develop adequate depth in fields they do address because their limited geographical coverage does not justify greater investment in skills and equipment.

The CTCS was conceived with a number of key features, inter alia:

a. Relies on a network of existing institutions;

b. Provides practical direct assistance to medium and small enterprises;

c. Strengthens Caribbean Technological Units;

d. Uses CDB/TEU (Technology and Energy Unit) as the network co-ordinator, and closely integrates with the TEU information service and communications programme as the 'show-how' component;

e. Draws on UNIDO for some back-up expertise and TCDC links;

f. Provides and updates an inventory of existing consultancy capabilities in the Caribbean;

g. Ensures fast response through electronic communications; and

h. Uses a step-by-step approach to attract resources based on early success.

16. On the TRIs side, existing technologically oriented institutions with established or potential capacity to carry out operational tasks at the plant level were invited to participate in the network. In this respect 11 TRIs were invited to contribute their services in the following functional areas:

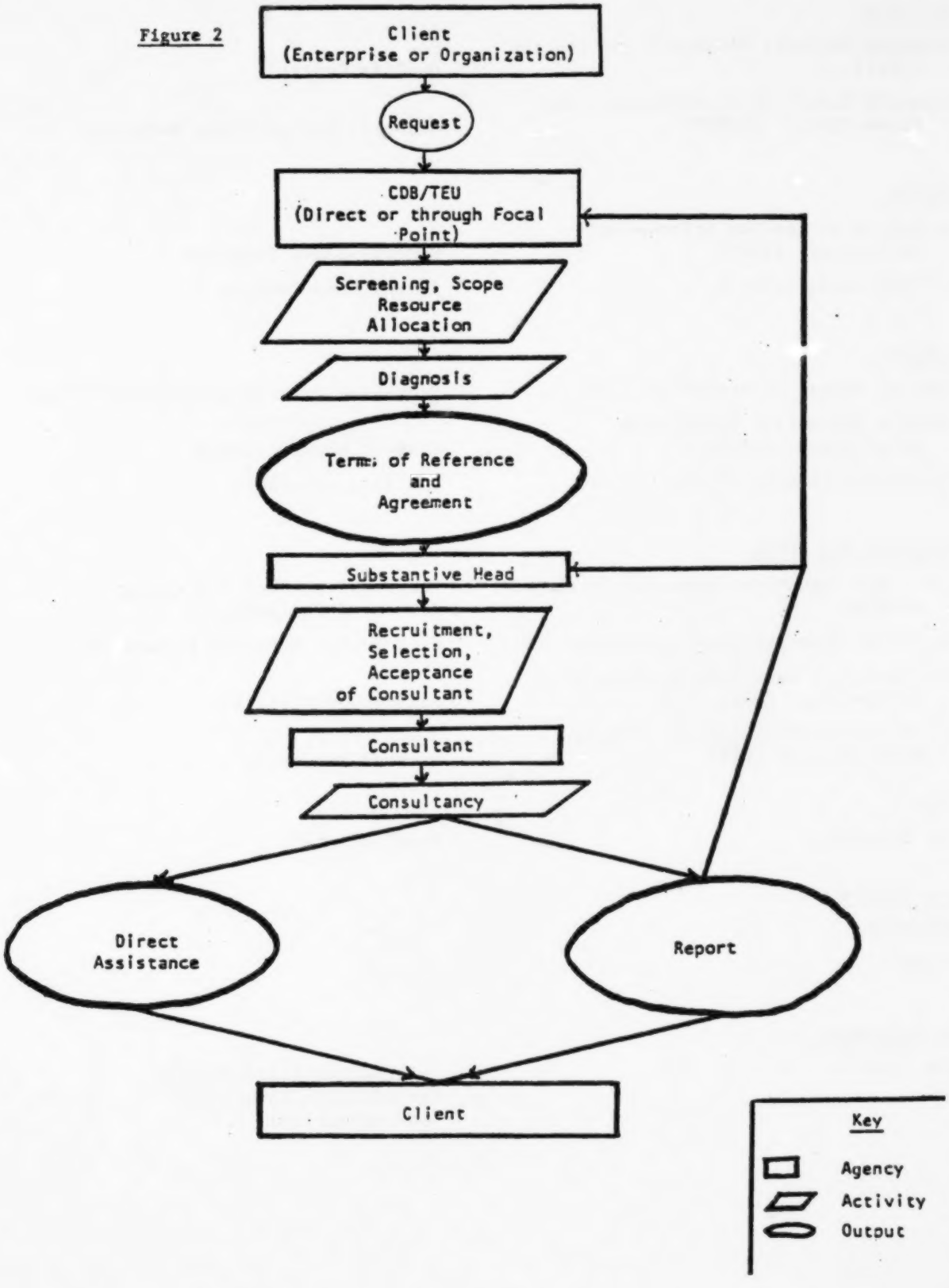
- Product Design
- Product Line Rationalization
- Production Processes
- Technology Transfer (licensing,etc.)
- Quality Control
- Packaging Design and Testing
- Equipment Selection and Acquisition
- Energy Conservation
- Maintenance (preventive and breakdown)
- Capacity Utilization
- Contract R+D
- Technology Adaptation
- Training
- Costing and Finance
- Technical Management
- Industrial and Technological Information
- Environment Controls

17. Along this line, the following institutions were identified for a tentative network membership with the respective specialities:

Institution	Tentative Speciality
Barbados	
Barbados National Standards Institution (BNSI)	Quality Control
Barbados Institute of Management and Productivity (BIMAP)	Capacity Utilization, Marketing
Guyana	
Institute of Applied Science and Technology (IAST)	Mineral-based Products
GUYSTAC Consultancy Unit	Energy Conservation
Jamaica	
Jamaica Bureau of Standards (JBS)	Packaging + Furniture Manufacturing
Jamaica Industrial Development Corporation (JIDC)	Garment Manufacturing
Scientific Research Council (SRC)	Building Materials
Trinidad and Tobago	
Caribbean Industrial Research Institute (CARIRI)	Electronics, Food Processing Household Equipment
Caribbean Meteorological Institute (CMI)	Wind Energy Resource Assessment
University of West Indies, Faculty of Engineering (UWI)	Building Materials
University of West Indies, Seismic Research Unit (UWI)	Mineral Resources
LDCs	
The DFCs/NDCs	Focal Points
Non-CARICOM	
INDOTECH	*
ICAITI	*
Co-ordinator	
CDB (TEU)	Information Dissemination (in addition to network co-ordination)

18. The routine operations of CTCS, as conceived is presented in the flow-chart as Figure 2.

Figure 2



19. The services would be furnished by request from the enterprises submitted to the network co-ordinating agency through the respective local focal point organization. These local focal point organizations created in each of the participating countries, function similar to the SBAC in the case of the Philippines national programme. On basis of the specialities available at the TRIs, an appropriate institute was invited to provide the services requested.

20. In order to ascertain the viability of the concept, the project was initiated as a pilot operation, and during the first nine months since starting the programme activities, CDB was able to handle some 40 technical assistance requests to the industries. Short illustrations of some of the assignments carried out are described in Annex II*/.

21. The major problem which is facing the CTCS is the mobilizing of financial resources to support and sustain the network activities. Without doubt, services for production activities of an industrial enterprise should in principle be borne by the respective enterprises. On the other hand, experience indicates that in the case of SMIs, productivity improvement is often neglected on account of the non-availability of the services itself, and the cost involved. The CTCS/TSDS provides a solution to the former, however, the latter problem still requires to be looked into if the ultimate objective of improving the technological performances of SMIs are to be achieved.

V. CONCLUSIONS

22. It appears that the TSDS/CTCS concept does contribute to solve to a large extent problems of increased and strengthened technological services delivery to the SMIs from local TRIs using their existing and available capacities and capabilities.

23. It should, however, be noted that each country, sub-region or region would have to take into account the particular needs and characteristics prevailing in order to ensure the most suitable and effective system that would solve its purpose.

---

*/ Extract from the CDB/TEU Newsletter, No.9 June 1983.

24. The governments usually do have various SMI promotional measures, including financial support. In order to benefit from such SMI development funds, the CTCS/TSDS concept would have to be recognized and integrated into the national programme.

25. Considerations should be given to have financial resources made available to support the TRIs, at least at the initial stage of the TSDS/CTCS operation to enable them to carry out the technical assistance and advisory services, which may not have been included in their presently ongoing work programme at the scale and frequency demanded by the TSDS activities. In other words, assistance provisions delivered by the TRIs would have to be subsidized to a certain extent, at least during the initial stages of implementation and until the respective TRIs include these activities in their regular work programme and budget.

26. The following are some of the pre-requisites which have to be met if an effective system were to be implemented:

i. The programme should be developed on basis of a total package approach, covering services related not only to technological needs but also functional, management, training, marketing, information, etc.

ii. The system/network requires a strong national/regional co-ordinating body, and an effective network of industrial extension service units.

iii. In order to improve the technology delivery to the SMIs, it is desirable that appropriate emphasis be given to R+D of TRIs and to be oriented to problem/solving and applied engineering development. The strengthening of the TRI delivery capabilities could also be attained if the system/network is utilized when technical assistance from international organizations and agencies, particularly of short-term nature be channelled through the system/network in order that the knowledge and experience of the international experts would also be disseminated to the relevant staff of the TRIs.

iv. The TSDS/CTCS also contributes effectively to the identification and recognisation of problems of the SMIs, which, if carefully monitored and assessed, could form an effective and useful basis for the formulation by the TRIs of their work programmes on R+D, training arrangements, information activities, so-called industrial extension services, etc., as well as the priority settings and budget allocations. This leads inevitably to the strengthening of the technological capabilities and capacities in the developing countries, as emphasized in the Vienna Programme of Action on Science and Technology for Development.

ANNEX I

TSDS: THE ILAGAN/PHILIPPINE EXPERIENCE

In March 1980, the TSDS project team conducted a Technical Seminar on Modern Finishing Techniques for the furniture makers of Ilagan, Isabela (Region II, Northeastern Luzon). Organized by the SBAC, the project was implemented with the assistance of FORPRIDECOM, one of the TRIs of TSDS and furniture experts from the private sector.

This project did much to strengthen the inactive furniture makers association that had existed for the past four years. The association members realized that there was still much to be learned as far as furniture technology was concerned. They were grateful, however, that the association leaders initiated the implementation of the seminar with very little costs on the part of the members.

After the seminars, three leaders of the association approached the project team and presented their plans to set up a kiln dryer. They explained that at present, the furniture makers have no access to kiln dried lumber which is ironical since Region II is one of the major sources of lumber. Kiln dried lumber supply is essential before modern furniture production technologies may be utilized. At that time, the association was supplying only the local furniture market, but with a steady supply of kiln dried lumber, the Metro Manila market may be supplied since technical assistance may be sourced from FORPRIDECOM.

The association leaders further explained that technical assistance related to the construction and operation of a drier was available from private consulting firms but the consultancy fees quoted were excessive. They inquired about the possibility of assistance being provided by either the Ministry of Industry or FORPRIDECOM. At this point, the TSDS project team and FORPRIDECOM representative pledged to investigate the possibility of providing such assistance on a cost sharing basis between Government institutions and the association. It was clearly explained however, that subsidized technical assistance may be provided only if the majority (seventy percent) of the association members would participate in the venture.

After this meeting with the association leaders, the following events occurred:

1. FORPRIDECOM provided rough estimates of project cost (₱350,000) based on earlier studies.
2. In June 1980 a new corporation, Ilagan Industries Inc. was formed with the assistance of the local SBAC. All of the twenty five (25) members of the association invested in the corporation.
3. The SBAC, with the assistance of the FORPRIDECOM, prepared a detailed feasibility study.
4. By August 1980, the association increased its membership from twenty five (25) members to forty-seven (47) members. The new twenty two (22) members also invested in the corporation. By this time all of the forty-seven (47) furniture makers in the town of Ilagan, Isabela were both members of the association and shareholders of the corporation.
5. In August 1980, a loan application was forwarded to the Development Bank of the Philippines.
6. In October 1980 a technical seminar on modern furniture construction techniques was organized by SBAC and implemented with the assistance of FORPRIDECOM and furniture experts from the private sector.
7. A ₱300,000 loan was approved by the Bank in early 1980.

The kiln dryer was constructed by the corporation with the assistance of FORPRIDECOM. Assistance of FORPRIDECOM centered on the design, supervision of the critical stages of construction and metal parts fabrication and training the operation of the kiln dryer. The corporation shouldered the board and lodging expenses of the FORPRIDECOM technical personnel while FORPRIDECOM and the Ministry of Industry shouldered incremental transportation costs.

As a result of the kiln dryer project, the Ilagan Industries Inc. is currently planning to implement a joint marketing scheme in which furniture and furniture components will be supplied to the Metro Manila market.

By the time the Ilagan pilot common facilities seemed to be well on its way, the SBAC in other regions initiated similar kiln dryer projects. The same approach of providing technical assistance were initiated in the metalworking industries for creating similar common service facility projects.

The following examples in this respect can be counted:

- BUTUAN (Region X) Metalworking Association Foundry Project;
- CAGAYAN DE ORA (Region X) Metalworking Association, Heat Treatment Project;
- ZAMBOANGA (Region IX) Metal Association, Electro-plating Project;
- SORSOGON (Region V) Furniture Maker's Association, Kiln Dryer Project;
- BACOLOD (Region VI) Furniture Maker's Association, Kiln Dryer Project; etc.

ANNEX II

CTCS/CARIBBEAN EXPERIENCE */

The first three months of 1983 have seen an increase in activity under the pilot project. Following are some of the assignments carried out so far:

Reconnaissance Visit to St. Vincent Arrowroot Industry:

In January Prof. R. Whistler, a leading starch expert from mid-western USA visited St. Vincent to make an assessment of technical assistance needs of the arrowroot industry. Prof. Whistler felt that arrowroot is on its way out as a starch because of cheaper alternatives. He advised local officials on ways of resuscitating the industry, such as introducing more efficient processing and packaging techniques and promoting the use and development of arrowroot by-products.

Assistance to Caribbean Garment Industry:

CTCS success with garment manufacturers in Antigua has influenced a call for help from the Chairman of the Regional Garment Task Force. Mr. Samaroo has approached the CTCS for assistance in developing a similar programme to that developed in Antigua for garment manufacturers throughout the Caribbean.

SRC Assists Belizean Clay Brick Manufacturer:

A Belizian manufacturer received assistance from the Scientific Research Council (SRC) of Jamaica in determining the extent and quality of clay deposits in his area, with a view to establishing the use of clay bricks for construction work in Belize. Over 150,000 long tons of high-quality clay were identified and samples of the clay deposits have been shipped to Jamaica for testing.

Assessment of Chemical Pollution Problem by UWI Faculty of Engineering:

A senior lecturer from the Faculty of Engineering at the St. Augustine Campus in Trinidad and Tobago has defused a potential problem of supposed chemical pollution posed by a new industrial plant in one of CDB's member countries. The plant will exhaust several thousand pounds of reactive hydrocarbons annually into the air and it was felt that this could cause serious problems of contamination in nearby factories. The investigation established that the levels of pollution will be within safe limits but recommended that the situation be monitored.

---

*/ Extract from the CDB/TEU Newsletter No.9 June 1983, "CTCS Update".

Guyana Receives TA in Charcoal Marketing:

The Guyana Charcoal Unit has received technical assistance from a Barbadian consultant in the marketing of charcoal as a possible replacement for charcoal briquettes. The Unit has several tons of charcoal available for export and can produce over 10 tons per day. The consultant has submitted the names of persons who can handle the product in Barbados and a trial shipment has been planned. A similar marketing plan is scheduled for Trinidad and Tobago.

UWI Seismic Research Unit Assesses Pumice Deposits in St. Lucia:

A resource person from the Seismic Research Unit at the St. Augustine Campus in Trinidad has determined the extent of reactive pumice (Dacite) deposits in St. Lucia. Using sophisticated geophysical techniques, Dr. D. Morgan revealed that there are sufficient pumice deposits at five sites to last approximately 25 years if used in place of beach sand for concrete mixes. This information will assist in determining the feasibility of long-term investments in the manufacture of cement/pumice blends in St. Lucia.